The Effect Of Neighborhood Environment On The Risk Prevalence Of Heart Failure

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Abstract

The conventional risk factors that lead to the development of heart failure complications are characterized by the nature of the diet, lifestyle as well as the genetics of an individual. However, new research studies show that the neighborhood of an individual also plays a critical role in exposing the individual to possible risks of heart failure. This research paper seeks to outline the findings of Dr. Akwo, who is a post-doctoral research expert based at the Vanderbilt University Medical Center in Nashville, TN. (Smith et al., p. 405). Mr. Akwo, together with his colleagues, recently identified that the neighborhood of an individual is a critical factor that increases the risk of heart failure.

Introduction

The heart failure condition is developed when the heart becomes incapable of pumping sufficient blood that is rich in oxygen to help in the proper functioning of other organs of the body. People who reside in deprived areas of residence have a higher chance of developing heart failure compared to individuals from wealthier areas of residence (Elvis et al. p e004052). This means that the risk prevalence of developing heart failure is highly dependent on the socioeconomic status of an individual or that of their neighborhood.

According to the Centers for Disease Control and Prevention (CDC), more than 5.7 million adult persons living in the United States are already diagnosed with heart failure condition. Currently, there exists no cure for heart failure, and therefore, people diagnosed with the heart condition must observe control measures as prescribed by physicians in order to prolong their survival (Elvis et al. p e004052). These control measures include making appropriate changes in their lifestyles as prescribed by the physician and seeking proper medication and surgical treatments. Patients who regularly seek these treatments as recommended by the medical personnel have higher chances of prolonging their survival. However, reports indicate that nearly half of the total number of patients diagnosed with heart failure lose their lives within a period of 5 years after being diagnosed with the condition.

The heart failure condition is prevalent in the Southeastern part of the US, hence the region is

regarded as the heart failure belt. This is because the region has the highest occurrence of the established heart risk factors, which include coronary heart disease, hypertension, diabetes as well as obesity. The prevalence of these risk factors may be related to the socio-economic features of the population in the region, which influence the health results (Elvis et al. p e004052). Recent data sources suggest that neighborhood factors can also be used to predict the risk likelihood of an individual developing a heart failure condition independently of the socio-economic status of the individual. It is, however, not yet established whether the neighborhood factors can independently influence the likelihood of risks of HF incidences among individuals with low economic status. The main objective of this research study is to investigate whether neighborhood factors can independently influence the outcomes of heart failure, including the prevalence of the heart failure condition among individuals with low socioeconomic status.

Methods

The research study involved middle-aged participants, of which 86% were enrolled at the community health centers while the rest were enrolled through mail-based sampling from among the population. The participants provided their demographics, SES, lifestyle as well as anthropometric information and individual medical history that were recorded using standardized computer-assisted individual interviews and personal questionnaires for the recruited participants from the mail-based sampling (Elvis et al. p e004052).

In this research study, a total number of 27 078 participants, of which 7,001 were aged 65 years and above, 20 077 were aged less than 65 years old at the time of their enrollment. The socio-economic status of the participants was determined using the census tract data, which are the relevant proxy and were easily used to determine the SES of each participant once they provided information about their residential addresses (Elvis et al. p e004052). The incidence of heart failure was investigated by computing the duration of follow-up from the time of enrollment of the participants up to the time they were diagnosed with HF.

Cox analyses that were adjusted using multiple variables were utilized to design a flexible relation between the NDI, which was designed using restrained cubic splines with four knots, and heart failure accounting for the purpose of non-linearity as well as non-additivity of the impacts by race affiliations. The log relative hazard of the incident heart failure was calculated from the model that was fully adjusted to reflect the values of the observed deprivation index. The values of the covariates were also held at their values of reference. The covariates were then plotted on the y-axis against NDI by race on the x-axis (Elvis et al. p e004052). The value of reference that was used during the computation of the log relative hazard was considered as the modal category for very categorical covariate and dichotomous covariate.

The value of reference for every continuous covariate was considered the median. The covariates that were used in the model include the age of the participant at the enrollment, the racial affiliation of the

participant, whether black or white, the terms of the interaction of NDI multiplied by race for both linear and nonlinear, sex of the participant, Another covariates include the participant smokes cigarettes or not, or whether he used to smoke, alcohol takers or not and many others.

Researchers also conducted an assessment on the sensitivity, leaving out the heart failure cases that were diagnosed within the first two years of follow-up to minimize the likelihood of the cases of heart failure being identified immediately after the time of enrollment might not have been impacted by the values of the baseline of NDI. The assumptions made in the model were authenticated by the use of Shenfield residuals and log (-log) plots. The analyses of this research study were conducted by use of STATA and arms package for R version 3.1.1 (Elvis et al. p e004052).

Results

The mean age of the participants at the time of enrollment was estimated at 55.5 years. The female participants were estimated at 62.7%, while 69% of the total number of participants belonged to the black community. Out of the total number of participants, 69.9% had an annual household income of less than 15 000 US dollars, while 38.6% of them had an education status of not beyond high school, 44.8% of the participants had obesity (Sundquist et al. p. 843). The mean value of the National Death Index was estimated at 0.85 with a range between -2.4 and 6.0 values that indicated the increasing levels of neighborhood deprivation (Elvis et al. p e004052). There was a moderate negative correlation between the national death index and the annual income per household, which was estimated at -0.23, while the correlation for education was estimated at -0.17. The majority of the participants residing in the most deprived neighborhoods were observed to be young in age, from the black community and were obese in comparison with their counterparts from the less deprived neighborhoods (White et al., p. 228). They also had less education status, a lower annual income of less than 15000 a year and were found to be current smokers compared to their less deprived counterparts. These participants were also more likely to record cases of diabetes and high blood pressure at the baseline.

A total of 4,300 participants, which represented 16% of the total participants, developed an incident heart failure after a follow-up time of 5.5 years. The median value of the 25th percentile was 3.2 years, while the 75^{th} percentile had a median value of 6.8 years. The participants in the third-placed tertile registered the highest rate of incident heart failure that was age-standardized standing at 37.7 per 1000 person-years, in comparison with 28.4 per 1000 person-years as well as 33.9 per 1000 person-years for participants categorized I tertiles 1 and 2 consecutively (Elvis et al. p e004052).

In the analysis of race, the research findings from the meanest model suggested a critical heterogeneity of impacts based on race. The heart failure findings stood at 1.34 Cl, with 1.21 to 1.47 among whites, and at 1.09 Cl, with 1.04 to 1.15 among blacks. The P for interaction was found to be at 0.0005. The estimations of the points in full models were found to be less disparate among the different groups of races. The risk of developing of developing heart failure increased by 20% where

the HR stood at 1.20 Cl, 1.07 to 1.34 among the white participants for every single IQR increase in the national death index and an increase of 10 % for blacks where the heart failure stood at 1.10, 1.10 to 1.17 among blacks.

The sensitivity analysis left out 1752 cases of heart failure for participants diagnosed in the period within the first two years of follow-up time, and only 2548 cases were involved in the analysis. The estimates of the effects were identical, with a heart failure of 1.13 for 95 %Cl, in the range from 1.06 to 1.20 for the general cohort in the models that were fully adjusted.

Discussion

The relationship between the national death indexes and the incidence of heart failure among both black and white participants with low SES living in the Southeastern US showed findings. From the relationship, it is evident the people residing in the most deprived neighborhoods had a higher prevalence of cardiovascular disease risk factors. These high levels are also related to the increase in heart failure risk independent of other risk factors.

The literature also shows that there is a strong relationship between the socioeconomic features of an individual and the risk of heart failure. Recent data findings indicate that the socioeconomic status of the neighborhood plays a crucial role in protecting the outcomes of heart failure, such as heart failure admissions and readmissions. However, the evidence for the relationship with the incidences of heart failure cannot be substantiated (Elvis et al. p e004052). The research study done in this paper shows that the connection between the increased rate of neighborhood deprivation and the increase in the risk of heart failure is independent of the other risk factors.

A non-negligible proportion of variance at 5% of the incidences of heart failure is obtained, which can be attributed to the socio-economic factors in the neighborhood environment. The neighborhood as a risk factor can be used to forecast the prevalence of incidence of coronary heart disease, which means it can be applied to heart failure.

During the study, the researchers, Mr. Akwo and his colleagues, conducted an analysis of data obtained from a total number of 27,078 adults who were aged between 40 years and 79 years old. These people participated in the Southern Community Cohort Study, which conducted research studies on the health of adults living in 12 states in Southeastern America during the period between 2002 and 2009. 69% of the adults were African American, and the number of women who participated in the study stood at 63% (Elvis et al. p e004052). The participants were put into three groups that represented variations in the socio-economic status of their neighborhoods, including the most deprived, the moderately deprived and the least deprived neighborhoods.

The participants were monitored for the period with a median of 5.2 years. Over this period of 5.2 years, more than 4,300 participants developed the condition of heart failure. The result findings from the study established that those adults from the most deprived neighborhoods reported the highest

number of occurrences of heart failure condition at the rate of 38 per 1000 person-years (Heiss p. 720). The people who resided in the least deprived neighborhood had a risk prevalence rate of 28.4 per 1000 person-years to the condition of heart failure.

Further, when the scientists adjusted the data of the participants to reflect their risk prevalence to the heart failure condition based on their age, sex, race, as well as lifestyle and clinical factors, there was a 12% increase in the risk prevalence from the least deprived neighborhoods to the most deprived neighborhood (Elvis et al. p e004052). Generally, the research findings indicated the neighborhood of each participant contributed to a 4.8 % risk of being diagnosed with heart failure. This was concluded after the researcher adjusted data on the education and income status of the subjects (Bikdeli, P.752). According to Loren Lipworth, who is a co-senior study author, there is existing evidence that proposes that there is a strong relationship between the socioeconomic status of an individual to the risk prevalence of developing a heart failure condition as well as other numerous diseases.

The research study found out that the features that described the neighborhood in which the subject resides play a critical role in influencing the risk prevalence of developing heart failure in addition to the socioeconomic characteristics of the individual such as education, level of income and the nature of the occupation. Researchers also found out that due to the fact that the primary focus of their studies was based on middle-aged members of the society who earned low income, these results cannot possibly be applied to other members of the population (Elvis et al. p e004052). However, these results are crucial in the formulation of community-based interventions that can assist individuals within society to minimize their risks of developing heart failure condition.

Dr. Elvis Akwo asserts that the professionals who enforce public policy need to focus on neighborhoods because of their role in exposing the members of society to the risks of heart failure. He also notes that the authorities should enhance the resources at the community level in order to mitigate the risk prevalence to the risk of heart failure within the communities. He further notes that the suggestions proposed from the research study could have a defining impact on the efforts aimed at controlling the risks of individuals developing a heart failure condition. (Elvis et al. p e004052). These research studies present the research gaps that can lead to more experimental studies for the development of proper interventions and the determination of appropriate measures to be put under test in order to enhance the health of the cardiovascular systems of the communities using a population-based approach instead of an individual-based approach.

A closely related analysis is available in Risks Prevalence Of Heart Failure In Various Neighborhoods.

Conclusion

It is evident from the research findings that the socio-economic factors present in the neighborhood crucially forecast the incidence of heart failure without depending on income as well as the level of education of the individual and other risk factors of cardiovascular diseases. Societies that monitor

the prevalence of cardiovascular diseases, such as the American Heart Association, have noted that for there to be a significant improvement in universal cardiovascular healthcare, good strategies are necessary in order to address the whole extent of the system of healthcare. Thus, public policy, preventive measures, acute care, care for chronic patients and rehabilitation measures need to be relooked to ensure overall improvement.

It is worth noting, however, that measures that concentrate on public policy, as well as preventive measures, can prove useful in reducing the burden of cardiovascular diseases and enhancing the health of the people. Areas with people living in less privileged neighborhoods should benefit more from these improvements in the policies available in public health.

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